

# NASA TECH BRIEF



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## High-Temperature Thermionic Emission Microscope

A thermionic emission microscope has been designed to operate with metal specimen cathode temperatures of 2000°C. The microscope has a special lens and high-voltage section. Its basic components are: specimen mount and heater, x, y, z traverse mechanism, lenses, screen and Faraday cage, and vacuum system. The specimen mount and heater assembly are attached to a 0.001 inch accurate micrometer drive which provides a three-axis precision method of surveying the specimen surface as well as a method of measuring the microscope's magnification. The lenses and high-voltage section provide magnifications of 80 to 1400 power and resolution of 0.1 micron. The Faraday cage has been incorporated to measure current ( $\geq 10^{-15}$  ampere) from the grains of the cathode specimen. The Faraday cage is guarded to prevent current leakage across insulators in the measuring circuit. Microscope components are housed in a stainless steel chamber with bakeable ultrahigh-vacuum

flanges, windows, and ceramic insulators. The chamber is mounted on a vacuum pump capable of evacuating the system to  $3 \times 10^{-10}$  torr.

### Note:

Documentation for the innovation is available from:  
Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Price \$3.00

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### Patent status:

No patent action is contemplated by NASA  
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